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ABSTRACTS OF THE PROCEEDINGS

OF THE

GEOLOGICAL SOCIETY OF LONDON.

No. 272.]

[Session 1873-74.]

November 5, 1873.—Prof. Ramsay, F.R.S., Vice-President,
in the Chair.

Lieut. Daniel List Brain, 4th King's Own Royal Regiment; Arthur Underhill, Esq., B.A., 1 Child's Place, Temple, E.C.; James Taylor Smith, M.D., Colpike, Nightingale Lane, Clapham Common, S.W.; and the Rev. Arthur Beanland, North Street, Sleaford, Lincolnshire, were elected Fellows of the Society.

The following communications were read:—

1. "On the Skull of a species of *Halitherium* from the Red Crag of Suffolk." By Prof. W. H. Flower, F.R.S., F.G.S.

The specimen described, which is in the collection of the Rev. H. Canham, of Waldringfield, is from the so-called coprolite- or bone-bed at the base of the Red Crag, and presents the usual aspect of the mammalian remains from that bed. It is of especial interest as furnishing the first recorded evidence of the existence in Britain of animals belonging to the order Sirenia. The fragment consists of the facial part of the cranium, separated, probably before fossilization, from the posterior part at the fronto-parietal suture, and in a line descending vertically therefrom. It was afterwards subjected to severe attrition, by which many of the projecting parts have been removed, but sufficient remains to enable its general relationship to known forms to be determined. The whole of that portion of the maxillæ in which the molar teeth were implanted is preserved.

The author compared the fossil skull with those of the existing and extinct species of the order, and stated that while it presents many characters common to the Manati and the Dugong, there are others by which it differs from both, the most striking being the more normal development of the nasal bones and the outer wall of the nasal fossæ, and especially the dentition, in all of which it shows a more generalized condition. The existence in it of maxillary teeth removes it still further from *Rhytina*. In general character the molars correspond with those of the genus *Halitherium*, in which the author considered that this fossil found its nearest ally in *H. Schinzi*, Kaup, from the Miocene of the Rhine Valley, a formation in which several of the animals of the Red Crag bone-bed are known to occur. The differences, however, especially the larger size of the cranium, in the Crag specimen, and the larger size of its teeth,

induce the author to regard it as a distinct species, which he proposes to name *Halitherium Canhami*.

DISCUSSION.

Mr. PRESTWICH thought the specimen a most interesting addition to the derived fossils of the lower beds of the Red Crag. It was most likely derived from some of the Miocene beds which formerly existed, probably on what is now the basin of the German Ocean.

Mr. H. WOODWARD mentioned that in the Woodwardian Collection there was a skull of *Halitherium* from the Miocene of Darmstadt. It was, he thought, of great interest to meet with these Miocene forms in the Crag, most of the fossils of which appear to have been derived from the lower beds of the London Clay.

Dr. LEITH ADAMS mentioned the discovery of a tooth of *Halitherium* in a calcareous bed in Malta, where also he had discovered one of the ear-bones.

Mr. SEELEY pointed out that the skull presented some peculiarities, which made him doubt whether it could rightly be ascribed to *Halitherium*. He thought possibly it might belong to a new genus; at the same time he had noticed in the Crag deposits some vertebræ which he thought might be attributed to *Halitherium*.

The CHAIRMAN was glad to find that so many geologists were disposed to regard the majority of the fossil bones from the Crag as derivative. He had long regarded them as belonging to a Miocene period, and probably a late one, and to a time when this country was united to the continent. When at the Crag period a portion of the surface was submerged, the neighbouring land might, however, have been still inhabited by the old Miocene fauna.

2. "New Facts bearing on the Inquiry concerning Forms intermediate between Birds and Reptiles." By Henry Woodward, Esq., F.R.S., F.G.S.

The author, after giving a brief sketch of the Sauropsida, and referring especially to those points in which the Pterosaurians approach and differ from birds, spoke of the fossil birds and land reptiles which he considered to link together more closely the Sauropsida as a class.

The most remarkable recent discoveries of fossil birds are:—

I. *Archæopteryx macrura* (Owen), a Mesozoic type, which has a peculiar reptilian-like tail, composed of twenty free and apparently unanchylosed cylindrical vertebræ, each supporting a pair of quill-feathers, the last fifteen vertebræ having no transverse processes, and tapering gradually to the end.

II. *Ichthyornis dispar* (Marsh), discovered by Prof. O. C. Marsh in 1872 in the Upper Cretaceous beds of Kansas, U. S. It possessed well-developed teeth in both jaws. The teeth are set in distinct sockets, and are all more or less inclined backwards.

III. *Odontopteryx toliapica* (Owen), an Eocene bird from the London Clay of Sheppey, the skull of which alone has been dis-

covered, has very prominent denticulations of the alveolar margins of the jaws.

The author then referred to the Dinosauria, some of which he considered to present points of structure tending towards the so-called wingless birds.

I. *Compsognathus longipes* (A. Wagner), from the Oolite of Solenhofen, is about two feet in length, having a small head with toothed jaws, supported on a long and slender neck.

The iliac bones are prolonged in front of and behind the acetabulum; the pubes are long and slender. The bones of the fore limbs are small, and were probably furnished with two clawed digits. The hind limb is very large, and disposed as in birds, the femur being shorter than the tibia. The proximal division of the tarsus is ankylosed with the tibia as in birds.

II. The huge carnivorous *Megalosaurus*, ranging from the Lias to the Wealden, had strong but not massive hind limbs, and short reduced fore limbs; it moved with free steps, chiefly if not solely on its hind limbs, which is true also of the vegetable-feeding lizards of the Mesozoic rocks.

The author next drew attention to the Frilled Lizard of Australia (*Chlamydosaurus Kingii* (Gray)), which has its fore limbs very much smaller than the hind limbs, and has been observed not only to sit up occasionally, but to run habitually upon the ground on its hind legs, its fore paws not touching the earth, which upright carriage necessitates special modifications of the sacrum and pelvis bones.

The Solenhofen Limestone, in which Pterosauria are frequent, and which has yielded the remains of *Archæopteryx* and of *Compsognathus*, has also furnished a slab bearing a bipedal track, resembling what might be produced by *Chlamydosaurus* or *Compsognathus*. It shows a median track formed by the tail in being drawn along the ground; on each side of this the hind feet with outspread toes leave their mark, while the fore feet just touch the ground, leaving dot-like impressions nearer the median line. Hence the author thought that while some of the bipedal tracks which are met with from the Trias upwards may be the "spoor" of struthious birds, most of them are due to the bipedal progression of the Secondary Reptiles.

DISCUSSION.

MR. SEELEY thought that the footprints on the slab cited in the paper had been produced by some saurian, such as a Pterodaetyle, the fore limbs of which were wider apart than its hind limbs, rather than by *Compsognathus*. If the foot-track had been due to a saurian walking on its hind legs only, he thought that the principal impressions must of necessity have been nearer together. He disputed the correctness of the term "adaptive modification" as applied to the air-cavities in bones. He was inclined to regard the Pterodaetyle as more closely allied to Birds than did the author of the paper. The condition of the carpus, as well as the tarsus, in these reptiles showed their ornithic affinities. He cited jerboas, kan-

garoos, and other forms, in which the hind legs were mainly used for progression, but in which the sacrum and other bones were not modified, as instances calculated to inspire caution in connecting the mode of progression with structure.

Mr. HULKE could not regard the tracks as those of a Pterodactyle, as the inner marks were much less distinct than the outer, and would therefore hardly be due to the hinder limbs, on which the weight would mainly fall.

Mr. BLANFORD agreed with Mr. Seeley that the mere fact of the *Chlamydosaurus* walking on its hind legs did not suffice to prove any affinity with Dinosaurians.

Mr. WOODWARD, in reply, stated that the two points on which he had mainly founded the paper were:—1st, the occurrence of foot-prints in the Solenhofen limestone, characteristic of a bipedal progression of some saurian, which had, moreover, used its tail from time to time to give it a forward impetus; and 2ndly, the method of walking of *Chlamydosaurus*. With regard to animals thus progressing, he was not prepared to accept the view that there was no corresponding modification in structure.

3. "Note on the Astragalus of *Iguanodon Mantelli*." By J. W. Hulke, Esq., F.R.S., F.G.S.

The author exhibited and described an astragalus of *Iguanodon* from the collection of E. P. Wilkins, Esq., F.G.S. The bone was believed to be previously unknown. It is a bone of irregular form, having on its lower surface the characteristic pulley-shape of a movable hinge-joint. The upper surface presents a form exactly adapted to that of the distal end of the tibia, so that the applied surfaces of the astragalus and tibia must have interlocked in such a manner as to have precluded all motion between them. The author remarked upon the interest attaching to this fact in connexion with the question of the relationship between the Dinosauria and Birds.

4. "Note on a very large Saurian Limb-bone, adapted for progression upon land, from the Kimmeridge Clay of Weymouth, Dorset." By J. W. Hulke, Esq., F.R.S., F.G.S.

The bone described by the author presents a closer resemblance to the Crocodilian type of humerus than to any other bone, and he regarded it as the left humerus of the animal to which it belonged. Its present length is 54 inches, but when perfect it could hardly have been less than 63 inches in length. The middle of the shaft is cylindroid. Its transverse section is of a subtrigonal figure, and presents a large coarsely cancellated core, enclosed in a compact cortical ring. The bone is considerably expanded towards the two extremities; the distal articular surface is oblong, and divided into a pair of condyles by a very shallow vertical groove; below, the anterior border, in its proximal half, is much wider than the corresponding portion of the posterior border, and is flattened and produced downwards into a ventrally projecting crest; and the distal half

of this border forms a thin, rough crest, projecting forwards. The presence of these crests distinguishes the present humerus from those of *Pelorosaurus* and of *Cetcosaurus oxoniensis*; but the general correspondence of the bone with the humerus of the latter species leads the author to refer it provisionally to a species of *Cetcosaurus*, which he proposes to name *C. humero-cristatus*.

DISCUSSION.

MR. SEELEY remarked that the internal structure of the bone resembled that found in *Gigantosaurus*, and the general form of the humerus was such as might be expected did it belong to an animal of that genus.

5. A despatch from Mr. Alfred Biliotti, British Vice-Consul at Rhodes (dated June 16, 1873), communicated by H. M. Secretary of State for Foreign Affairs, and relating to a volcanic outburst in the island of Nissiros, one of the Sporades, in which there existed a volcano supposed to be extinct. Shortly before the 10th June new craters opened in this volcano, and from them ashes, stones, and lava were ejected; many fissures, from which hot water flowed, were produced in the mountain, and the island was daily shaken by violent earthquakes. From Rhodes, at a distance of about 50 miles, the smoke rising from the new craters could be seen.

The following specimens were exhibited:—

An astragalus of *Iguanodon Mantelli*; exhibited in illustration of his paper, by Mr. Hulke.

Snout of *Halitherium Cunhami*; exhibited in illustration of his paper, by Prof. Flower.

South-African Diamonds, including some specimens remarkable for their size and perfect crystalline form; exhibited by Prof. Tennant, F.G.S.

The next Meeting of the Society will be held on Wednesday, November 19th, when the following papers will be read:—

1. "Supplementary Note on *Hypsilophodon Foxii*." By J. W. Hulke, Esq., F.R.S., F.G.S.

2. "The Drift-beds of the North-west of England.—Part 1. Shells of the Lancashire and Cheshire Low-level Boulder-clay and Sands." By T. Mellard Reade, Esq., F.G.S.

3. "Note on a deposit of Middle Pleistocene Gravel near Leyland, Lancashire." By R. D. Darbishire, Esq., F.G.S.

4. "Notes on the Structure sometimes developed in Chalk." By H. G. Fordham, Esq., F.G.S.

